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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/653,882	09/04/2003	Tse-Yao Huang	HUAN3211/EM	4935

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EXAMINER

GHYKA, ALEXANDER G

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 02/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/653,882	Applicant(s) HUANG ET AL. (PNU)	
	Examiner Alexander G. Ghyka	Art Unit 2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

ALEXANDER GHYKA
PRIMARY EXAMINER

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Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The RCE of 1/18/2006 has been entered.

Claims 1-8 are under consideration.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-3 and 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Donohoe et al (US 6,890,863) in view of Tang et al (US 5,010,032).

The present Claims generally require providing a pad oxide layer on the substrate; forming a pad nitride layer on the pad oxide layer; forming an oxide layer on

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the pad nitride layer; forming a mask of a predetermined pattern on the oxide layer; and forming contact holes by plasma etching, the plasma etching using a plasma composition consisting essentially of argon, oxygen, a first perfluorocarbon and a second perfluorocarbon, the fluorine to carbon ratio of said perfluorocarbon being higher than that of said perfluorocarbon.

In re Claim 1, Donohoe et al disclose providing a substrate **100** ; forming a pad oxide layer on said substrate, forming a pad nitride layer on said pad oxide layer; forming an oxide layer on said pad nitride layer (column 7, lines 26-37); forming a mask **40** of a predetermined pattern on said oxide layer (column 7, lines 39-42); and forming contact holes by plasma etching (column 10, lines 7-10), the plasma etching using a plasma composition comprising argon, a first fluorocarbon and a second fluorocarbon, the fluorine-to-carbon ratio of said fluorocarbon being higher than that of the first fluorocarbon (column 5, lines 51-61 and column 9, lines 25-300).

In re Claims 2 and 6, Donohoe et al further teaches the first fluorocarbon is C₅F₈ (column 5, line 61).

In re Claims 3 and 7, Donohoe et al further teaches the fluorine to carbon ratio of said second fluorocarbon is higher than 8:5 (column 9, 10-15).

In re Claim 5, Donohoe et al teaches using using plasma etching to open contact holes. See column 9, lines 1-10.

Donohoe et al differs from the present claims in that it does not disclose oxygen gas in the plasma composition.

Tang et al teaches having oxygen gas in normal fluorine-based oxide etch chemistries for etching contact holes into oxides (column 11, lines 55-59).

It would have been obvious for one of ordinary skill in the art at the time of the invention to have included oxygen gas in the plasma composition of Donohoe et al with fluorocarbons for etching of an oxide layer to make high aspect ratio contact holes, for its known benefit in the art as an etchant in normal fluorine based oxide etching compositions. The use of the oxygen gas for its known benefit, as an etchant, would have been *prima facie* obvious to one of ordinary skill in the art.

With respect to the limitation "consisting essentially of" limits the scope of a claim to the specified material or steps " and those that do not materially affect the basic and novel characteristics" of the claimed invention. *In re Herz*, 537 F. 2d 549, 551-552, 190 USPQ 461, 463 (CCPA 1976). For purposes of searching for and applying prior art under 35 USC 102 and 103, absent a clear indication in the specification or claims of what the basic and novel characteristics actually are, "consisting essentially of" will be construed as equivalent to "comprising". See *PPG Industries v. Guardian Industries*, 156 F. 3d 1351, 1354, 48 USPQ 2d 1351, 1353-1354. If an Applicant contends that additional steps or materials in the prior art are excluded by the recitation of "consisting essentially of" applicant has the burden of showing that the introduction of additional steps or components would materially change the characteristic of applicants' invention. See *In re De Lajarte* , 337 F. 2d 870, 143 USPQ 256 (CCPA 1964). In the present case, no such showing has been made.

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Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Donohoe et al (US 6,890,863) in view of Tang et al (US 5,010,032), as applied to claims 1-3 and 5-7 above, and further in view of Donohoe et al (US 6,784,111).

Donohoe et al (6,890,863) and Tang et al (Us 5,010,032) are applied as discussed above.

However, neither reference discloses the second fluorocarbon is C₃F₈, as required by present Claims 4 and 8.

Donohoe et al (US 6,784,111) teaches forming contact holes with plasma etching by utilizing a mixture gas having a high ratio of carbon/fluorine such as C₃F₈, C₄F₈, C₅F₈. See column 7, lines 3-4)

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to have used C₃F₈ as an etchant in the composition as disclosed by the Donohoe (US 6,890,863) and Tang (US 5,010,032) references, for its known benefit in the art as an etchant for forming contact holes. The use of the C₃F₈ gas for its known benefit, as an etchant, would have been *prima facie* obvious to one of ordinary skill in the art.

Response to Applicants Arguments

Applicants argue that "consisting essentially of" language obviates the rejection as the cited prior art discloses the inclusion of hydrofluorocarbons along with the perfluorocarbons. As discussed above, with respect to the limitation "consisting

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essentially of" limits the scope of a claim to the specified material or steps " and those that do not materially affect the basic and novel characteristics" of the claimed invention. *In re Herz*, 537 F. 2d 549, 551-552, 190 USPQ 461, 463 (CCPA 1976). For purposes of searching for and applying prior art under 35 USC 102 and 103, absent a clear indication in the specification or claims of what the basic and novel characteristics actually are, "consisting essentially of" will be construed as equivalent to "comprising". See *PPG Industries v. Guardian Industries*, 156 F. 3d 1351, 1354, 48 USPQ 2d 1351, 1353-1354. If an Applicant contends that additional steps or materials in the prior art are excluded by the recitation of "consisting essentially of" applicant has the burden of showing that the introduction of additional steps or components would materially change the characteristic of applicants' invention. See *In re De Lajarte* , 337 F. 2d 870, 143 USPQ 256 (CCPA 1964). In the present case, no such showing has been made. As the cited prior art references disclose the presence of combinations of perfluorocarbons having different fluorine to carbon ratios, a *prima facie* case of obviousness is established.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander G. Ghyka whose telephone number is (571) 272-1669. The examiner can normally be reached on Monday through Thursday during general business hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AGG
January 29, 2006

ALEXANDER GHYKA
PRIMARY EXAMINER

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